



(11) **EP 4 414 033 A3**

(12) **EUROPEAN PATENT APPLICATION**

(88) Date of publication A3:
30.10.2024 Bulletin 2024/44

(43) Date of publication A2:
14.08.2024 Bulletin 2024/33

(21) Application number: **24170617.5**

(22) Date of filing: **06.02.2020**

(51) International Patent Classification (IPC):
A61K 38/20 (2006.01) **A61K 35/17** (2015.01)
A61K 39/00 (2006.01) **A61P 35/00** (2006.01)

(52) Cooperative Patent Classification (CPC):
A61K 38/20; A61K 38/2013; A61K 38/2046;
A61K 39/4611; A61K 39/4631; A61K 39/464402;
A61P 35/00; C12N 5/0636; A61K 2039/55527;
A61K 2039/55533; A61K 2239/31; A61K 2239/38;
C12N 2501/2307; C12N 2501/2315; C12N 2510/00

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME

(30) Priority: **08.02.2019 PCT/EP2019/053144**

(62) Document number(s) of the earlier application(s) in
accordance with Art. 76 EPC:
20702490.2 / 3 920 960

(71) Applicant: **BIONTECH CELL & GENE THERAPIES**
GMBH
55131 Mainz (DE)

(72) Inventors:
• **SAHIN, Ugur**
55131 Mainz (DE)
• **OEHM, Petra**
55131 Mainz (DE)
• **RENGSTL, Benjamin**
55131 Mainz (DE)
• **REINHARD, Katharina**
55131 Mainz (DE)

(74) Representative: **Graf, Roland**
ZSP Patentanwälte PartG mbB
Hansastraße 32
80686 München (DE)

(54) **TREATMENT INVOLVING CAR-ENGINEERED T CELLS AND CYTOKINES**

(57) The present disclosure relates to methods and agents for enhancing the effect of T cells engineered to express chimeric antigen receptors (CARs). These methods and agents are, in particular, useful for the treatment of diseases characterized by diseased cells expressing an antigen the CAR is directed to.

Specifically, the present disclosure relates to methods comprising providing to a subject T cells genetically modified to express a chimeric antigen receptor (CAR) and administering to the subject IL2 or a polynucleotide encoding IL2. The methods of the disclosure may comprise administering IL2 or a polynucleotide encoding IL2 and a further cytokine or a polynucleotide encoding a

further cytokine, wherein the further cytokine may be IL7 or IL21. The T cells genetically modified to express a CAR may be provided to the subject by administering the T cells genetically modified to express a CAR or by generating the T cells genetically modified to express a CAR in the subject. The methods of the disclosure may further comprise administering to the subject an antigen or a variant thereof, or a polynucleotide encoding an antigen or a variant thereof, wherein the T cell genetically modified to express a CAR are targeted to the antigen. In one particularly preferred embodiment, the polynucleotides administered according to the present disclosure are RNA.

EP 4 414 033 A3



EUROPEAN SEARCH REPORT

Application Number

EP 24 17 0617

5

10

15

20

25

30

35

40

45

50

55

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	XIAO-JUN XU ET AL: "Multiparameter comparative analysis reveals differential impacts of various cytokines on CART cell phenotype and function ex vivo and in vivo", ONCOTARGET, vol. 7, no. 50, 9 July 2016 (2016-07-09), pages 82354-82368, XP055510394, United States ISSN: 1949-2553, DOI: 10.18632/oncotarget.10510 * abstract *	1-15	INV. A61K38/20 A61K35/17 A61K39/00 A61P35/00
A	WO 2016/180467 A1 (BIONTECH CELL & GENE THERAPIES GMBH [DE] ET AL.) 17 November 2016 (2016-11-17)	1-15	
A,P	CONNOR J. DWYER ET AL: "Fueling Cancer Immunotherapy With Common Gamma Chain Cytokines", FRONTIERS IN IMMUNOLOGY, vol. 10, 20 February 2019 (2019-02-20), XP055660080, Lausanne, CH ISSN: 1664-3224, DOI: 10.3389/fimmu.2019.00263	1-15	TECHNICAL FIELDS SEARCHED (IPC) A61K A61P
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 19 September 2024	Examiner Vandenbogaerde, Ann
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03:82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO.

EP 24 17 0617

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

19 - 09 - 2024

	Patent document cited in search report	Publication date	Patent family member(s)	Publication date
10	WO 2016180467 A1	17-11-2016	AU 2016259726 A1	23-11-2017
			AU 2020203129 A1	04-06-2020
15			AU 2023219951 A1	14-09-2023
			BR 112017023478 A2	24-07-2018
			CA 2985156 A1	17-11-2016
			CN 107743399 A	27-02-2018
			CN 114533865 A	27-05-2022
20			DK 3294325 T3	21-08-2023
			EP 3294325 A1	21-03-2018
			EP 4273160 A2	08-11-2023
			ES 2952421 T3	31-10-2023
			FI 3294325 T3	15-08-2023
25			HK 1247098 A1	21-09-2018
			HK 1250330 A1	14-12-2018
			HR P20230902 T1	24-11-2023
			HU E062646 T2	28-11-2023
			JP 6914851 B2	04-08-2021
30			JP 2018515518 A	14-06-2018
			KR 20180027414 A	14-03-2018
			LT 3294325 T	11-09-2023
			PL 3294325 T3	02-10-2023
			PT 3294325 T	18-08-2023
35			RS 64420 B1	29-09-2023
			SI 3294325 T1	30-10-2023
			US 2018140634 A1	24-05-2018
			US 2020360438 A1	19-11-2020
			WO 2016180467 A1	17-11-2016
		WO 2016180778 A1	17-11-2016	
40	-----			
45				
50				
55				

ORM P0459